

What is claimed is:

1. An intermediate for an optical recording medium that has a central mounting hole formed in a central portion thereof and at least one kind of functional layer formed on one side thereof, for use in at least one of information recording and information reproduction, the intermediate being produced beforehand for manufacturing the optical recording medium,
  - the intermediate comprising a hollow cylindrical protruding portion protruding from one surface thereof on the same side as the one side of the optical recording medium,
  - wherein the intermediate has a circular recess formed in a central portion of the other surface thereof on a side opposite to the one side of the optical recording medium and having a diameter equal to a diameter of the central mounting hole, and a temporary central hole formed to extend through a central portion of the circular recess and having a diameter smaller than the diameter of the circular recess,
  - said hollow cylindrical protruding portion having an outer diameter smaller than the diameter of the central mounting hole and an inner diameter equal to or larger than the diameter of the temporary central hole, and having a central axis thereof substantially aligned with a center of the temporary central hole.
2. An intermediate as claimed in claim 1, wherein a recessed groove is formed in an inner bottom surface of the circular recess, in the vicinity of an inner peripheral surface of the intermediate defining

the circular recess, along the inner peripheral surface.

3. An intermediate as claimed in claim 1, wherein the diameter of the temporary central hole is set to be equal to or larger than 2 mm.

5        4. An intermediate as claimed in claim 1, wherein the outer diameter of said hollow cylindrical protruding portion is set to be equal to or smaller than 10 mm.

10       5. An intermediate as claimed in claim 1, wherein a length of protrusion of said hollow cylindrical protruding portion from the one surface of the intermediate is set to be equal to or larger than 0.5 mm.

15       6. An intermediate, as claimed in claim 1, wherein the inner diameter of said hollow cylindrical protruding portion is set to be equal to the diameter of the temporary central hole.

20       7. A mold for molding an intermediate for an optical recording medium, the mold including a first mold and a second mold, for having molten resin injected into a cavity defined between the first mold and the second mold in a closed state thereof to thereby mold the intermediate,

25       wherein the first mold includes a sprue bush having a through hole formed through a central portion thereof, the through hole opening in an opposed surface of said sprue bush opposed to the second mold, for injection of the molten resin therethrough, and having a diametrically expanded portion that is expanded with  
30       at least one step and opening in the opposed surface, and

the second mold includes a gate cutter formed with a hollow cylindrical portion protruding from a

central portion of an opposed surface of said gate  
cutter opposed to the first mold, said hollow  
cylindrical portion having an outer diameter smaller  
than an inner diameter of the diametrically expanded  
5 portion, and

wherein when said gate cutter is moved toward  
said sprue bush in the closed state of the first mold  
and the second mold, the opposed surface of said gate  
cutter is protruded into the cavity, and at the same  
10 time, said hollow cylindrical portion enters the  
diametrically expanded portion, whereby a cylindrical  
space is defined between an inner peripheral surface of  
the diametrically expanded portion and an outer  
peripheral surface of said hollow cylindrical portion,  
15 as a portion of the cavity, while maintaining a  
distance between the opposed surface of said gate  
cutter and the opposed surface of said sprue bush  
shorter than a thickness of the intermediate.

8. A mold as claimed in claim 7, wherein a  
20 projection for forming a recessed groove is formed on  
an outer periphery of the opposed surface of said gate  
cutter.

9. A mold for molding an intermediate for an  
optical recording medium, the mold including a first  
25 mold and a second mold, for having molten resin  
injected into a cavity defined between the first mold  
and the second mold in a closed state thereof to  
thereby mold the intermediate,

wherein the first mold includes a sprue bush  
30 having a through hole formed through a central portion  
thereof, the through hole opening in an opposed surface  
of said sprue bush opposed to the second mold, for  
injection of the molten resin therethrough, and having

a diametrically expanded portion that is expanded with at least one step and opening in the opposed surface, and

the second mold includes a molding sleeve having  
5 a hollow cylindrical shape and a gate cutter having a hollow cylindrical shape and slidably fitted in said molding sleeve, and

wherein when said molding sleeve and said gate cutter are moved toward said sprue bush in the closed  
10 state of the first mold and the second mold, an opposed surface of said molding sleeve opposed to said sprue bush is protruded into the cavity, and at the same time said gate cutter enters the diametrically expanded portion, whereby a cylindrical space is defined between  
15 an inner peripheral surface of the diametrically expanded portion and an outer peripheral surface of said gate cutter, as a portion of the cavity, while maintaining a distance between the opposed surface of said molding sleeve and the opposed surface of said  
20 sprue bush shorter than a thickness of the intermediate.

10. A mold as claimed in claim 9, wherein a projection for forming a recessed groove is formed on an outer periphery of the opposed surface of said molding sleeve.

25 11. A molding apparatus comprising:

a mold that includes a first mold and a second mold, for molding an intermediate for an optical recording medium by having molten resin injected into a cavity defined between the first mold and the second  
30 mold in a closed state thereof,

wherein the first mold includes a sprue bush having a through hole formed through a central portion thereof, the through hole opening in an opposed surface

of said sprue bush opposed to the second mold, for injection of the molten resin therethrough, and having a diametrically expanded portion that is expanded with at least one step and opening in the opposed surface, and

5       the second mold includes a gate cutter formed with a hollow cylindrical portion protruding from a central portion of an opposed surface of said gate cutter opposed to the first mold, said hollow  
10       cylindrical portion having an outer diameter smaller than an inner diameter of the diametrically expanded portion, and

      wherein when said gate cutter is moved toward said sprue bush in the closed state of the first mold  
15       and the second mold, the opposed surface of said gate cutter is protruded into the cavity, and at the same time, said hollow cylindrical portion enters the diametrically expanded portion, whereby a cylindrical space is defined between an inner peripheral surface of  
20       the diametrically expanded portion and an outer peripheral surface of said hollow cylindrical portion, as a portion of the cavity, while maintaining a distance between the opposed surface of said gate cutter and the opposed surface of said sprue bush  
25       shorter than a thickness of the intermediate; and

      urging means urging said gate cutter toward said sprue bush,

      wherein after a start of injection of the resin, when pressure of the resin is high, said gate cutter is  
30       moved toward said second mold by the pressure of the resin against a urging force of said urging means, to thereby allow the resin to fill the cavity, whereas when the pressure of the resin is lowered after

completion of filling of the cavity with the resin,  
said gate cutter is moved toward said sprue bush by the  
urging force of said urging means.

12. A molding apparatus as claimed in claim 11,  
5 wherein a projection for forming a recessed groove is  
formed on an outer periphery of the opposed surface of  
said gate cutter.

13. A method of manufacturing an optical  
recording medium that has a central mounting hole  
10 formed in a central portion thereof and at least one  
kind of functional layer formed on one side thereof,  
for use in at least one of information recording and  
information reproduction,

the method including:

15 an intermediate-preparing step of preparing an  
intermediate as claimed in any one of claims 1 to 6 by  
resin molding;

a functional layer-forming step of forming the at  
least one kind of functional layer on the one surface  
20 of the prepared intermediate; and

a central hole-forming step of forming the  
central mounting hole through the intermediate having  
the at least one kind of functional layer formed  
thereon.

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